The Ontario Power Authority Supply Mix Report: A Review and Response

EBR Registry No: PO05E0001

Prepared by:

Mark S. Winfield, PhD
Director, Environmental Governance

With contributions by:

Roger Peters, MEng
Senior Technical and Policy Advisor

And

Matt Horne, MRM
Senior Policy Analyst

February 2006

Toronto Office: C/O Centre for the Environment, Innis College, 2 Sussex Ave, Toronto, Ontario, M5S 1J5
Tel: 516-978-5656 - Fax: 416-971-2078- www.pembina.org

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Introduction

The Ontario Power Authority's Supply Mix Advice Report, released on December 9, 2005, outlines a proposed blueprint for meeting Ontario's electricity needs by 2025. [1]

The Ontario Power Authority (OPA) report concludes that, as a result of the actions taken to date by the provincial government, Ontario will have sufficient electricity supplies to meet the province's needs until 2013. According to the OPA, however, Ontario will need to add 15,000 megawatts (MW) of new generation capacity between 2013 and 2025 to meet electricity demand. The OPA recommends that between 63%–83% of this new generation capacity should be nuclear.[1]

The Pembina Institute has identified a number of major concerns regarding the Power Authority's "supply mix advice" and the assumptions upon which it is based. These concerns include the following:

- The OPA overestimates Ontario's likely rate of electricity load growth from 2005 to 2025;
- The OPA underestimates the potential for electricity efficiency improvements to reduce demand for electricity;
- The OPA underestimates Ontario's renewable energy supply potential;
- The OPA underestimates the potential for cogeneration (combined heat and power plants) to assist in meeting electricity needs;
- The OPA overestimates the cost and supply risks associated with the use of natural gas for electricity generation;
- The OPA underestimates the environmental and economic costs and risks of nuclear power.
- The overall methodology for assessing the environmental performance of supply options is fundamentally flawed, and the underlying analysis contains significant gaps.

[1] Ontario Power Authority, *Supply Mix Advice Report*, Volume 1, (Toronto December 2005), pp. 39, 49.

More broadly, the vision underlying the OPA's advice remains fundamentally supply oriented. Despite the Government of Ontario's stated commitment to the establishment of a "conservation culture," the OPA does not articulate a comprehensive strategy to improve the energy efficiency and productivity of Ontario's economy. Such a strategy is essential to the economic prosperity of a province that has limited indigenous energy sources and whose imported primary energy sources, particularly natural gas and uranium, are subject to price and supply fluctuations beyond Ontario's control. As the Ontario Clean Air Alliance has highlighted, competing U.S. states have achieved significantly higher electricity productivity than Ontario, due in large part to the impact of comprehensive efficiency strategies.[2]

Unfortunately, the OPA's policy development process was relatively closed, particularly when compared with other recent policy development processes on complex public policy issues in Ontario, such as Part 2 of the Walkerton Inquiry.[3] As a result, the assumptions and research that form the basis of the OPA report have not been subject to external assessment and review. Consequently, the OPA's report does not provide a sufficiently rigorous basis on which to proceed with decisions that may carry major economic, environmental, health and safety costs and risks for present and future generations of Ontarians.

The Pembina Institute's specific comments on the OPA advice and its basis are as follows. Rather than providing a comprehensive analysis, we have focused on a number of key areas to illustrate the problem of the contested assumptions that underlie the OPA's recommendations.

The Rate of Electricity Load Growth

The OPA's projections of a "gap" in electricity supply are driven principally by two factors:

- A projected growth electricity demand of 0.9% per year; and
- The retirement of most of the province's existing nuclear power plants by 2025.

It is important to note that the OPA's estimate of growth in demand is nearly double the actual rate of electricity demand growth between 1990 and 2003 of 0.5% per year.[4] In fact, the rate of growth in electricity demand in Ontario has been in decline since the 1950s.

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[2] Jack Gibbons, *A New Electricity Strategy for Ontario* (Toronto: Ontario Clean Air Alliance, October 2005), Table 2.
[3] See The Hon. Dennis O'Connor, *Report of the Walkerton Inquiry: A Strategy for Safe Drinking Water* (Toronto: Queen's Printer, 2002), Chapter 16 on the Part II process.
[4] Gibbons, *Meeting Ontario's Electricity Needs: A Critical Review of the Ontario Power Authority's Supply Mix Advice Report* (Toronto: Ontario Clean Air Alliance, January 2006), p. 2, based on data from Statistics Canada.

Although there has been a slight acceleration of the rate of growth in recent years, the OPA provides no evidence in support of its conclusion that the rate of growth in electricity consumption will continue to accelerate in the future.[5]

The longer-term trend of declining growth in electricity consumption reflects, among other things, structural changes in the economy, particularly the decline of heavy manufacturing and concentration of growth in the service and knowledge sectors, that have been taking place since the 1970s.[6] These structural trends are likely to continue; therefore, the rate of growth in electricity consumption may slow even further. At the same time, the concentration of the province's economic growth in service and knowledge sectors may present opportunities for additional energy efficiency gains in the commercial and institutional sector building sector. A large potential for energy efficiency gains has been identified in the sector.[7]

In addition, other recent analyses have highlighted the risks of extrapolating estimates of future population and economic growth from current trends as it may lead to overestimates of the levels of population growth and economic activity likely to actually occur. The study completed for the Neptis Foundation in January 2006 regarding the population and economic projections informing land-use and growth management planning in the Greater Golden Horseshoe region is particularly noteworthy in this regard.[8]

The OPA's analysis incorporates a number of other assumptions that have the potential effect of inflating the province's future electricity needs. The OPA assumes, for example, the need for a reserve margin of 18% by 2020–2025. This is substantially higher than current and short-medium term required reserves (13.7%–16.4%). The projection is based on assumptions about the technological uncertainly of future generating technologies.[9] However, most of the proposed technologies, with the exception of new forms of nuclear power, are already well established with commercially proven performance. A system that

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[5] The Pembina Institute notes that the business as usual projection developed by Mark Jaccard and Associates for the Pembina Institute's *Power for the Future* study falls in the range of the OPA's estimates, but also notes that the CIMS model though which the projection was developed also does not consider the impact of structural economic change or the possibility of economic downturns over the projection period.

[6] See generally Thomas Courchene and Colin R. Telmer, *From Heartland to North American Regional State: The Social Fiscal and Federal Evolution of Ontario* (Toronto: University of Toronto, 1998). Volume 3 of the Supply Mix Advice Report References a decline in primary and resource extraction industries, and towards secondary and value-added industries (pg.62) but not the larger shift in economic and employment growth from manufacturing and resource extraction to service and knowledge based sectors.

[7]. See for example. Mark Winfield, et al., *Power for the Future: Towards a Sustainable Electricity System for Ontario* (Ottawa: Pembina Institute, 2004).

[8] See Will Dunning Inc., *Economic Influences on Population Growth and Housing Demand in the Greater Golden Horseshoe* (Toronto: Neptis Foundation, January 2006).

[9] OPA, *Supply Mix Advice Analysis Report (Volume 2),* p. 168.

is more reliant on smaller, distributed sources of generation than large centralized generating facilities may also require a lower reserve margin. In addition, line losses may be significantly reduced in a decentralized system with many small generating facilities located close to consuming loads, as opposed to a system relying on a small number of large centralized generating facilities and extensive high voltage lines for distribution.[10]

As the Ontario Clean Air Alliance has pointed out, in the event that Ontario's electricity consumption and peak day demand grows at the current rate of 0.5% per year between 2006 and 2025, Ontario's peak electricity supply "gap" identified by the OPA would fall by 37% from 15,000 to 9,378 MW[11] by 2025. If Ontario's electricity demand is merely held steady at 2006 levels, then the "gap" would fall by 59% to 6,146MW.[12]

Energy Efficiency Potential

The OPA identifies a potential to reduce Ontario's peak electricity demand through conservation and demand management initiatives at between 1,850MW and 4,350MW relative to business-as-usual scenarios by 2025. However, the OPA supply mix advice relies on the lower range of this energy efficiency potential (1820MW) for planning purposes.[13] In fact, the estimate employed by the OPA includes both demand response reductions of peak demand and end-use efficiency improvements.[14]

The OPA's estimate is substantially less than has been identified as technologically feasible, economically rational and achievable in other recent analyses, including the study completed by ICF Consulting for the OPA itself.[15] The ICF report, for example, identified an achievable saving of more than 2500MW from end use efficiency improvements under its least aggressive energy efficiency policy scenario.[16] More aggressive, but still cost-effective policy scenarios produced estimates of achievable savings of more than 4700MW[17] from end use efficiency improvements. As the OPA Supply Mix Advice Report itself notes, the

[10] The line losses associated with Ontario's current centralized generation system were estimated as being equivalent to 7.5% of total electricity generation in 2002. Ontario Energy Board, *2003-04 Annual Report*, pg.19.
[11] Based on calculations by Gibbons, Ontario Clean Air Alliance.
[12] See, Gibbons, *Meeting Ontario's Electricity Needs: A Critical Review of the Ontario Power Authority's Supply Mix Report*. p. 3.
[13] OPA, *Supply Mix Advice Report*, p.47.
[14] OPA, *Supply Mix Advice Report*, p. 47.
[15] ICF Consulting, *Assessment of Energy Efficiency Potential: 2006-2025 Final Report* (October 2005).
[16] ICF Consulting, *Assessment of Energy Efficiency Potential: 2006-2025 Final Report*, Table 7.
[17] ICF Consulting, *Assessment of Energy Efficiency Potential: 2006-2025 Final Report*, Table 7.

planning assumptions employed by the OPA are well below the CDM targets established by the authority's own Conservation Bureau.[18]

The Pembina Institute, for its part, working in conjunction with researchers at Simon Fraser University's Energy and Materials Research Group (EMRG), identified a potential for technologically feasible and economically rational reductions in electricity consumption and peak demand of 73,000GWh/yr/12,300 MW relative to business-as- usual projections by 2020. These savings would be achieved through a combination of improvements in end-use efficiency, fuel switching and cogeneration.[19] Specifically, a potential contribution of 6700MW from industrial and commercial sector cogeneration was identified, along with 4000MW from improved end use efficiency in all sectors,[20] and 1600MW from fuel switching, principally electricity to natural gas for water heating in the residential and commercial sectors. The potential savings from end-use efficiency identified by the Pembina Institute are in the same range as those identified by ICF under its more aggressive, but still economically rational, policy scenarios.

In addition, the Pembina Institute notes that Torrie Smith Associates identified a technological potential to reduce electricity consumption and demand similar to that found by the Institute using a separate model.[21] The Pembina Institute also noted the identification of the potential for reductions of up to an additional 10% off-peak demand via demand response measures.[22]

We note that the OPA's assessment of the potential for demand side measures excluded the potential for fuel switching in its analysis. The Pembina Institute's analysis identified potential electricity savings of 10,000GWh/yr from fuel switching from electricity to natural gas for hot water heating alone.[23]

During a November 2005 workshop hosted by the Pembina Institute, Pollution Probe and the Canadian Renewable Energy Alliance, speakers from the United States outlined the

[18] OPA, *Supply Mix Advice Report*, pg.16. The Chief Conservation Office has set targets of a 5% reduction in peak electricity demand and a 10% reduction in total electricity consumption by 2007. See http://www.conservationbureau.on.ca/

[19] See generally Winfield et al., *Power for the Future* (2004).

[20] The Pembina Institute notes that CIMS may not capture the full potential of end-use efficiency in the commercial sector as none of the synergies between internal loads and cooling (efficient lighting and office equipment reduce cooling loads), lighting controls or building energy management systems are captured by the model.

[21] Ralph Torrie and Richard Parfett, *Phasing Out Nuclear Power in Canada: Towards Sustainable Energy Futures* (Ottawa: Campaign for Nuclear Phase-Out, July 2003).

[22] Winfield et al., *Power for the Future*, pg. 23 referencing Navigant Consulting, *Blueprint for demand response in Ontario* (Toronto: April 2003), prepared for the Independent Market Operator.

[23] Winfield, *Power for the Future*, Table 3.10.

major gains in energy efficiency that have already been achieved in states like Vermont and California through the use of a broad spectrum of energy efficiency programs.[24]

Low-impact renewable energy sources

The maximization of opportunities for renewable development is especially important, as wind, in-province hydro, solar and certain forms of biomass-based energy are the only energy sources indigenous to Ontario. Increased reliance on these sources will reduce the province's vulnerability to shifts in the international commodity prices of externally sourced fuels, such as coal, natural gas and uranium, over which it has no control.

The OPA is recommending that Ontario obtain 6,720 MW of renewable electricity between 2006 and 2025[25] in addition to the province's existing commitments for a total of 8,290MW. The new renewables would consist of 500MW generating capacity from biomass, 5,000MW from wind, 40MW of solar photovoltaic and1,500MW of waterpower.

On the basis of recent analyses from a number of sources, the Pembina Institute believes that the OPA has significantly underestimated the potential for low-impact renewable energy sources to contribute to Ontario's future electricity and overall energy systems.

Wind

The OPA recommends the acquisition of an additional 5,000MW of wind generation capacity by 2020.[26] The David Suzuki Foundation, by contrast, has identified a wind development potential of 8,000MW by 2012.[27] The study prepared by Helimax for the OPA identified 13,431MW of wind generation potential within 20 kilometres of the existing electricity grid in Ontario south of the 50th parallel.[28]

In addition, the OPA has assumed that only 10% of installed wind capacity will be available to meet peak demand.[29] Given that the capacity factor for modern land-based wind turbines is accepted to range from 25%–40%,[30] and that wind generating capacity in Ontario will be relatively geographically distributed, this may be an excessively conservative assumption.

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[24] www.pollutionprobe.org/Happening/events.htm
[25] OPA, *Supply Mix Advice Report*, p. 40.
[26] OPA, *Supply Mix Advice Report*, p. 48.
[27] Jose Etcheverry, et.al., *Smart Generation: Powering Ontario with Renewable Power* (Vancouver: David Suzuki Foundation, 2004).
[28] Helimax Energy Inc., *Analysis of Wind Power in Ontario* (November 2005).
[29] OPA, *Supply Mix Analysis Report(Volume 2)*, p. 170.
[30] OPA, *Supply Mix Analysis Report*, pp. 197-198.

Hydroelectric

The OPA's estimate of the potential for additional hydroelectric power at 1,447MW is below even the mid-point of the potential for development identified by the Ontario Waterpower Association (OWA). It is also important to note that bulk of the potential identified by the OWA (800MW-1,700MW/3,000-4,500Gwh) involves the redevelopment and upgrading of existing facilities and therefore is subject to minimal siting risks.[31] The OPA, for its part, only identifies 385MW of potential plant upgrades and extensions.[32]

The OPA may also underestimate the potential for out-of-province hydro developments in Labrador[33] or Manitoba[34] that are already being actively pursued by Ontario.[35] Use of already existing facilities in Quebec for storage purposes to support intermittent renewable electricity supplies does not appear to have been considered, despite the potential for major energy efficiency improvements in Quebec whose realization might be partially financed by Ontario to release storage and even base load generating capacity.

Biomass

The OPA suggests that Ontario's supply mix include up to 500MW of biomass generation.[36] This may significantly underestimate the potential for biomass development in Ontario.

According to the BIOCAP Canada Foundation, Ontario has the potential to produce 63 megatonnes of dry biomass per year, with 49% from forests, 46% from agriculture, and 5% from municipal waste streams. Assuming that half this amount would be used for liquid fuel production, 31.5 meg-tonnes of dry biomass could support 7,400 MW of power production capacity at an 80% utilization rate.[37] Careful consideration would have to be given to the environmental and energy impacts of municipal and industrial waste-based projects, although they form only a small portion of the province's overall energy potential from biomass sources.

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[31] Figures provided by the OWA February 2004.
[32] OPA, *Supply Mix Background Reports* (Volume 3), p. 98.
[33] Ministry of Energy, "Ontario Bid Moves on to the Second Phase for a Major Hydroelectric Project in Labrador," *News Release*, August 8, 2005.
[34] Ministry of Energy, "Manitoba, Ontario Sign Power Agreement" *News Release*, October 27, 2005.
[35] OPA assumes 1,250MW of imports from these sources. Up to 4,000MW appear to be under discussion with Manitoba and Labrador.
[36] OPA, *Supply Mix Advice Report*, p. 48.
[37] Gibbons, *Meeting Ontario's Electricity Needs*, pg.4, citing correspondence with David Layzell, CEO and Research Director, BIOCAP Canada Foundation, January 15, 2006.

Other Renewable Sources

The Supply Mix Advice Report ignores a number of renewable energy sources that have been identified as having the potential to contribute significantly to Ontario's energy supply, such as solar water heating and passive solar design in buildings[38] and geothermal heat pumps.[39]

The Supply Mix Advice Report also recommends a very small role for solar photovoltaic (PV) energy (40MW).[40] Although costly, solar PV, when used to assist with meeting summer peaks, may become competitive with the cost of imported power (60 cents/kWh),[41] which typically comes from high environmental impact sources, such as coal-fired generation in the Ohio valley. It is expected that solar PV costs will continue to fall steadily over time.[42]

In the context of large-scale solar PV projects currently being pursued in Europe and the United States, the Pembina Institute and the David Suzuki Foundation have suggested that a target in the range of 1,000MW installed capacity for the specific purpose of helping to offset summer peaks may be realistic by 2020/25 for these reasons.[43]

Natural Gas

The OPA suggests no more than1,500MW of natural gas supply be secured in addition to what is already in procurement (1,945MW). The new supply would consist of 500MW of natural-gas-powered fuel cells and 1,000MW of combined heat and power.[44] The OPA's recommendation is based principally on concerns regarding future price instability regarding natural gas. The Pembina Institute has previously indicated its view that an additional 2,500MW of natural gas fired supply be secured (for a total of 4,500MW) to facilitate a phase-out of coal-fired electricity generation in Ontario.

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[38] See generally Etcheverry, et al., *Smart Generation*, Chapter IV.
[39] See generally Etcheverry, *Smart Generation.*
[40] OPA, *Supply Mix Advice Report*, p. 48.
[41] Gibbons, *A New Electricity Strategy for Ontario*, pg.26, citing Ontario Energy Board Docket No. RP-2003-0144, Hydro One Networks and Hydro One Brampton, *Electricity Demand in Ontario* (November 2003), pg.5.
[42] Etcheverry, *Smart Generation*, p. 95.
[43] Winfield, *Power for the Future*, pp. 23-24, Etcheverry, *Smart Generation*, Table 3.
[44] OPA, *Supply Mix Advice Report*, p. 49.

The Pembina Institute notes the findings of research commissioned by the OPA that there are 77 years of natural gas supplies available in Canada at 2002 levels of consumption.[45] The Institute also notes that the available research on natural gas prices summarized by Canadian Energy Research Institute (CERI) for OPA suggests that annual average natural gas prices will be less than the $8/MMBTU assumed by the OPA for planning purposes.[46] Finally, the Institute notes that the risks of natural gas supply price instability for base load supply could be attenuated through the establishment of long-term supply contracts for natural gas supplies by the OPA.

The OPA's recommendations appear to assume very limited development of natural gas-fired cogeneration, with only 1,000MW being recommended as part of the supply mix.[47] Cogeneration is an extremely efficient way of using and producing energy, with the potential for overall power and heat efficiencies of 80%–90%. [48] According to a report prepared for the Ontario Ministry of Energy, Ontario's total CHP potential in 2020 will be 16,514 MW.[49] The modeling undertaken by the Pembina Institute and Simon Fraser University Energy and Materials Group identified a technically feasible and economically rational potential for more nearly 4,300MW of cogeneration in the commercial/institutional sector and more than 2,400MW of cogeneration in the industrial sector by 2020.[50]

As the Supply Mix Advice Report notes, the use of natural gas as a fuel for fuel cells is only 30%–40% efficient.[51] As a result, the use of natural gas as a fuel cell fuel may not be the most optimal potential use of natural gas relative to other options, particularly combined heat and power.

Nuclear Power

The OPA envisions nuclear power continuing to play a major role in Ontario's future electricity supply mix, both through the refurbishment of existing plans and new construction. In the Pembina Institute's opinion, the OPA's conclusions regarding the improvement in the cost and performance of nuclear energy are not supported by recent experience in Ontario.

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[45] OPA *Supply Mix Advice Report*, p. 80.
[46] Canadian Energy Research Institute, *Electricity Generation Technologies: Performance and Cost Characteristics*, (Prepared for OPA) August 2005), p. 86.
[47] OPA, *Supply Mix Advice Report*, p. 49.
[48] OPA *Supply Mix Analysis Report*, p. 210.
[49] Hagler Bailly Canada, *Potential for Cogeneration in Ontario: Final Report*, (August 2000), p. 25.
[50] Winfield, et Al., *Power for the Future*, Table 3.5. Supplemental analysis identified 25,563GWh/yr potential for cogeneration in the commercial sector.
[51] OPA, *Supply Mix Analysis Report*, p..210.

The OPA's economic analysis assumes that the capital cost of a new CANDU 6 nuclear reactor would be only $2,845/kW including heavy water costs.[52] This assumption is not credible for the following reasons.

- The actual cost of the Darlington Nuclear Station, the last nuclear power plant to be built in Ontario, was $4,058/kw.[53]
- All of the post-Darlington nuclear retrofit projects have been significantly over budget.
    - In August 1999, OPG estimated that the cost of returning Pickering A Unit 4 to service would be $457 million. The actual cost was $1.25 billion.
    - In August 1999, OPG estimated that the cost of returning Pickering A Unit 1 to service would be $213 million. The actual cost was 1.016 billion.[54]
    - Bruce Power estimated that it would be able to re-start Bruce A Units 3 and 4 for $375 million. The actual cost was approximately $725 million.[55]

The OPA's analysis also assumes that a new CANDU 6 nuclear reactor will be able to operate at an 85% annual capacity utilization rate for its entire economic life. This assumption is not supported by Ontario's actual experience with CANDU reactors. The average capacity utilization rates of Ontario's nuclear reactors fell from 80% between 1980 and 1983 to 51% in 2003.[56]

More broadly, the analysis provided by SENES Consultants[57] comparing the environmental impacts of generating options, and concluding that nuclear power offers the best environmental performance, is seriously flawed. These flaws include the following:

- Effectively ignoring the upstream impacts of nuclear energy. These impacts include the following:

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[52] *Supply Mix Analysis Report*, Volume 2, p. 219.

[53] Letter from Rosemary Watson, Freedom of Information Coordinator, Ontario Power Generation to Ravi Mark Singh, Ontario Clean Air Alliance, April 27, 2004; and Ontario Power Generation, *Sustainable Development Report 2004*, p. 41.

[54] Ontario Clean Air Alliance, *Increasing Productivity and Moving Towards a Renewable Future: A New Electricity Strategy for Ontario*, (October 2005), p. 15; and OPG, *News from Ontario Power Generation*, "Ontario Power Generation Reports 2005 Third Quarter Financial Results" (November 11, 2005).

[55] October 17, 2005 Letter to James Gillis, Ontario Deputy Minister of Energy from CIBC World Markets Inc.

[56] Government of Ontario, *Direction for Change*, (1997), p. 5. In 2003, Bruce Power and OPG produced 24,500 and 37,700 GWh of nuclear power respectively. Their total nuclear capacity was 13,864 MW. Bruce Power, *News Release*, "Bruce Power partners announce 2003 results" (January 27, 2004) and OPG, *Towards Sustainable Development: 2000 Progress Report*, p. 55 and *Towards Sustainable Development: 2003 Progress Report*, p. 32.

[57] SENES Consultants ltd., *Methods to Assess the Impacts on the Natural Environment of Generation Options* (Toronto: SENES, September 2005).

    - The generation of large quantities of wastes, a significant portion of which are radioactive and require perpetual care, from uranium mining and fuel production activities [58]
    - The serious groundwater contamination associated with uranium mine tailing and waste sites[59]
    - The air releases of radioactive contaminants associated with uranium mining and processing[60]
    - The disruption of landscapes and surface and groundwater flows as a result of uranium mining and mine waste management activities
    - The contamination of biota with radioactive contaminants in the vicinity of uranium mine sites[61]
- Downplaying the health risks associated with radiation releases from uranium mining, fuel production and plant operation.
- Ignoring the unique risks of catastrophic accidents associated with nuclear power plants.
- Ignoring the unique security and proliferation risks associated with nuclear energy facilities.
- Providing virtually no substantiation in support of its weighting of different types of environmental impacts, such as weighting greenhouse gas emission impacts as being 20 times more significant than waste generation, radiation or other environmental and health impacts. These weightings have the effect of improving the apparent environmental performance of nuclear energy relative to other supply options.
- Ignoring the fuel price and supply risks with uranium. We note that world uranium prices have quadrupled over the past decade[62] and that the availability of fuel for conventional (i.e. non-breeder type) reactors, even at current levels of consumption, is open to serious question towards the middle of the century.[63]

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[58] The SENES analysis only considered stored nuclear waste, not uranium mining wastes. On these wastes see generally, Canadian Nuclear Safety Commission, 2003, "Canadian National Report for the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management" Ottawa. Accessed October 17th, 2005 at http://www.nuclearsafety.gc.ca/pubs_catalogue/uploads/I0738_E.pdf.

[59] See, for example, Canadian Nuclear Safety Commission, *Comprehensive Study Report: Chuff Lake Decommissioning Project*, accessed October 25th, 2005.

[60] See, for example, Patricia Thomas, "Radio nuclides in the terrestrial ecosystem near a Canadian uranium mill-part I: Distribution and doses" *Health Physics*, 78(6): 614-624, June 2000.

[61] See, for example, Thomas, "Radio nuclides in the terrestrial ecosystem near a Canadian uranium mill-part I: Distribution and doses."

[62] Price data obtained from UxC Consulting Company, 2005, "Historical Month-End Ux Uranium Price Table," accessed November 11, 2005. www.uxc.com.

[63] On the 50 year fuel supply projections See World Nuclear Association, *Uranium Resources*, Accessed November 16th, 2005, www.world-nuclear.org/factsheets/uranium.htm.

- Downplaying the degree to which the nuclear waste fuel issue remains unresolved. While the Nuclear Waste Management Organization (NWMO) made a recommendation to the federal government in November 2005,[64] the federal government has made no decision with respect to this recommendation, and no steps have been taken to implement the NWMO recommendations. The issue of whether the NWMO's recommendations will provide for a safe, secure and ethically acceptable resolution of the waste fuel issue remains highly contested.[65]

The Pembina Institute will be completing and publishing its own study on the life-cycle impacts of nuclear energy shortly. The study will highlight that some of the most significant environmental impacts and risks of nuclear energy occur upstream and downstream from the actual point of electricity generation, and that nuclear power involves the creation of risks, particularly with respect to the management of upstream wastes and waste fuel, over extremely long time periods.

More broadly, the Pembina Institute notes that the unsubstantiated weighting assumptions contained in the SENES report seriously distort the apparent environmental performance of the various generation options considered in the OPA report.[66] Moreover, many of the environmental risks and costs associated with various generation operations are qualitatively different, involving risks with different environmental and health effects, occurring in different locations in time and space, and even different value choices, and therefore cannot be compared in the simplified manner presented in the report. The assessment of the environmental performance of the supply options presented in the OPA report must be considered invalid for these reasons.

The Next steps

The preceding examples are intended to illustrate the core problem underlying the OPA Supply Mix Advice Report. The report deals with extremely complex subject matter, and its conclusions and recommendations have major long-term implications for the province's economy and the environment and health of its residents. In many cases, its conclusions and recommendations involve implicit trade-offs of risks, costs and benefits between present generations and generations far into the future. At the same time, many of the key facts and assumptions underlying the report's conclusions are highly contested even

[64] Nuclear Waste Management Organization, *Choosing a Way Forward: Final Study Report* (Toronto: NWMO, 2005).
[65] See, for example, Sierra Club of Canada, "NMWO Report a Result of Mandate Twisting, Says Sierra Club of Canada," *News Release*, November 4, 2005.
[66] As presented, for example, in Figure 1.2.8. of the OPA report. SENES apparently relied on European Union ExternE reports. SENES, *Methods to Assess the Impacts on the Natural Environment of Generation Options*, pp. 9-2– 9-3.

among experts. There are profound disagreements among well-informed observers, for example, regarding the following:

- The likely rate of growth, if any, in Ontario's peak electricity demand and overall electricity consumption
- The risks, costs and likely performance of nuclear energy
- The likely performance and impact on future electricity demand of energy efficiency programs
- The realistic potential integrate large supplies of renewable energy from intermittent sources into the electricity grid
- The likely future trends in natural gas supplies and price
- The potential for the expansion of cogeneration in the industrial and commercial/institutional sectors
- The future trends in the cost and effectiveness of such technologies as solar thermal, solar photovoltaic, and ground source heat pumps;
- The evaluation and weighting of qualitatively different environmental, health, and security risks associated with different generating technologies
- The risks and benefits associated with an electricity system based on widely distributed generating facilities relying on a broad range of technologies, versus a system dependent on large centralized generating facilities relying on a very limited range of technologies

In addition to these issues, which are widely recognized as highly contested, there is an even wider range of variables with major implications for future electricity policy that do not seem to have been taken into consideration in the development of the OPA's advice. The long-term structural changes that have been taking place in the Ontario economy over the past thirty years are particularly noteworthy in this regard.[67] The implications of the impacts on Ontario's biophysical environment of global climate change[68] must also be more fully considered.

The OPA's policy development process leading up to the Supply Mix Advice Report was simply inadequate to generate good advice on such complex and contested issues. The process for developing the supply mix advice was essentially closed. The OPA received submissions from external stakeholders, but provided virtually no opportunity for discussion of contested issues among experts or stakeholders and made no serious effect to assess public views on the potential trade-offs and risks associated with the choices embedded in

[67] See generally Courchene and Telmer, *From Heartland to North American Regional State*.
[68] See generally Q.Chiotte et al., *Towards an Adaptation Action Plan: Climate Change and Health in the Toronto-Niagara Region* (Toronto: Pollution Probe, 2002).

the supply mix advice. As a result, the government is left without the benefit of the outcomes of such conversations to help inform its decision-making.

The lack of such discussions stands in stark contrast to other recent efforts to deal with complex and highly contested public policy issues in Ontario. In Part II of the Walkerton Inquiry, for example, which dealt with a wide range of complex and contested policy issues, commissioned research was made available to parties, other experts and the public as it was completed. The resulting background papers were the subject of expert meetings at which their assumptions, conclusions and recommendations on specific issues were discussed by paper authors, other experts and parties to the inquiry. There were also extensive opportunities for public presentations to the inquiry. The result was far more robust policy advice, with the compromises and trade-offs and their underlying rationale reasons being well understood by experts and stakeholders.

Ontario faces serious energy policy challenges. However, given OPA's projection that the electricity supply situation is relatively well in hand until at least 2014, as the Supply Mix Advice Report makes clear, Ontario also has the time to reflect properly on its options before decisions are made that irrevocably commit future generations to specific paths and risks. Ontario's electricity policies have suffered badly over the past decade from poorly grounded *ad hoc* decision making. The result has been a series of dramatic shifts in policy direction, and considerable uncertainty on the part of all stakeholders.

The province needs to ensure that its electricity and energy policies are informed by thorough discussion, and to build expert and social consensus before proceeding. The Pembina Institute notes that there has been no complete and open review of the provincial government's approach to electricity issues since the Porter Commission completed its work more than 25 years ago. The public meetings on the OPA supply mix advice announced by the provincial government on February 2, 2006, did nothing to address this need.

The current approval process for the Integrated Power System Plan (IPSP) to be developed by the OPA following from the supply mix advice delivered on December 9, 2005, would be focused on a review of the plan by the Ontario Energy Board (OEB).

In the Pembina Institute's opinion, an OEB review of the IPSP as provided for by the Bill 100 amendments to the *Electricity Act* and *Ontario Energy Board Act* would not provide an adequate assessment of the potential risks and costs associated with the OPA's proposed direction and potential alternatives to it.

The OEB's mandate to review the IPSP is limited to whether

> "*it complies with any directions issued by the Minister and is economically prudent and cost effective*. " [69]

More broadly, the Board's objectives with respect to electricity are defined within the *Ontario Energy Board Act* as defined as:

> *"1. To protect the interests of consumers with respect to prices and the adequacy, reliability and quality of electricity service.*
>
> *2. To promote economic efficiency and cost effectiveness in the generation, transmission, distribution, sale and demand management of electricity and to facilitate the maintenance of a financially viable electricity industry*." [70]

Neither mandate contains references to the environment or public health, safety and security in the evaluation of the plan to be developed by the OPA. Nor does the legislative framework provided through Bill 100 provide for evaluation of alternatives to the proposed plan. As a result, a simple OEB review of the IPSP as mandated through Bill 100 will not permit the identification and evaluation of the full range of risks and costs associated with different potential paths that the province might take with respect to its electricity system.

The Pembina Institute also emphasizes that project specific environmental assessments can in no way be a substitute for an environmental assessment of the overall IPSP. Indeed, it would be impossible to meaningfully answer the central questions of need and availability of alternatives that would arise in an individual project assessment, outside of the context of the overall plan of which the individual project forms part.

Given the nature and scale of the potential risks and costs associated with the path proposed by the OPA, a wider and more open assessment is required before the OPA can proceed with the implementation of an IPSP.

Two potential paths are available to the province to address this need.

Option 1: A Commission of Inquiry

[69] The Electricity Act, 1998 (as amended) s.25.30(4).
[70] *Ontario Energy Board Act, 1998 (as amended)* s.(1).

Part II of the Walkerton Inquiry demonstrated that a public inquiry can be structured to provide an effective framework for addressing complex policy issues within a reasonable time frame. An inquiry process would provide for the systemic identification and assessment of risks, constraints and potential responses to the province's electricity situation. Part II of the Walkerton inquiry also demonstrated the potential for process flexibility in an inquiry process to deal effectively with different types and sources of input (expert and public), and provide forums for meaningful discussion and debate. If done well, as was the case with Part II of the Walkerton Inquiry, these processes offer the opportunity to build consensus among experts and stakeholders around the definition of problems and constraints. An inquiry process would also allow for a wider consideration of issues in terms of the role of the electricity system in the province's economy and social and environmental sustainability.

A commission of inquiry would not remove the requirement for a provincial environmental assessment of the IPSP. However, it would greatly assist the framing of issues to be considered in the environmental assessment.

Option 2: Joint Board Hearing of the OEB and Environmental Review Tribunal

As noted earlier, the existing legislative framework already provides for an OEB hearing on the IPSP to be developed by the OPA. In addition, as a plan being undertaken on behalf of the provincial government, the IPSP to be prepared by the OPA will be subject to the province's *Environmental Assessment Act* unless specifically exempted. An exemption of the plan from the requirements of the Act would indicate a belief on the part of the government that the plan cannot withstand environmental scrutiny, and more broadly imply a failure to examine a central dimension to the overall sustainability of the plan. An environmental assessment of the overall plan is particularly essential given the fundamental flaws and gaps in the assessment of the environmental performance of different supply options contained in the OPA Supply Mix Advice Report.

Consideration must also be given to the precedent of the handling of the only initiative comparable to the proposed IPSP that Ontario has ever seen, the 1989 Ontario Hydro Demand Supply Plan (DSP). The DSP was reviewed under the *Environmental Assessment Act* and was the subject of public hearings by the Environmental Assessment Board.

An environmental assessment of the IPSP under the Ontario *Environmental Assessment Act* would provide a forum for examination of evidence regarding the province's electricity needs and options, and the examination of the full range of

risks and costs that they present on a full-cost life-cycle basis. A joint hearing of the Environmental Review Tribunal and the OEB could be employed to fulfill the requirements of the *Environmental Assessment Act* and the Bill 100 amendments to the *Electricity Act* with respect to the IPSP simultaneously. The analytical and approval requirements related to the IPSP could be dealt with in this way.

Regardless of which of these options the province chooses, it will be essential that the Ontario proceed with an aggressive energy efficiency and productivity strategy, and the continued rapid development of low-impact renewable energy sources. These “no regrets” policies are essential in the context of the province’s lack of indigenous energy sources other than renewables, and the need to improve Ontario’s energy productivity. The Pembina Institute will be supplementing its recommendations in this regard contained in *Power for the Future*. In particular, we will outline details of a ”quick start” energy efficiency strategy based on successful strategies pursued in other jurisdictions in the near future.

For more information Contact

Mark S. Winfield, PhD
Director, Environmental Governance
The Pembina Institute
Tel: 416.978.5656
Fax: 416.971.2078
e-mail: Markw@pembina.org
www.pembina.org